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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/480,309	01/10/2000	DAVID N. WILNER	11283/2	4170

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EXAMINER
ALI, SYED J

ART UNIT	PAPER NUMBER
2195	

DATE MAILED: 08/29/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

PTO-90C (Rev. 10/03)

	Application No.	Applicant(s)
Office Action Summary	09/480,309	WILNER ET AL.
	Examiner	Art Unit	
	Syed J. Ali	2195	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE _3_ MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.
- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on _25 April 2005_.

2a)☒ This action is **FINAL**.   2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) _1-3,5,8-10,13-23 and 25-27_ is/are pending in the application.

     4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) _1-3,5,8-10,13-23 and 25-27_ is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

     Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

     Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

     a)☐ All   b)☐ Some *   c)☐ None of:

         1.☐ Certified copies of the priority documents have been received.

         2.☐ Certified copies of the priority documents have been received in Application No. _____.

         3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

     * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1)☒ Notice of References Cited (PTO-892)

2)☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3)☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
     Paper No(s)/Mail Date _____.

4)☐ Interview Summary (PTO-413)
     Paper No(s)/Mail Date. _____.

5)☐ Notice of Informal Patent Application (PTO-152)

6)☐ Other: _____.

U.S. Patent and Trademark Office

PTOL-326 (Rev. 1-04)   **Office Action Summary**   Part of Paper No./Mail Date 20050822

DETAILED ACTION

1.   This office action is in response to the amendment filed April 25, 2005. Claims 1-3, 5, 8-

10, 13-13, and 25-27 are presented for examination.

2.   The text of those sections of Title 35, U.S. code not included in this office action can be

found in a prior office action.

Claim Rejections - 35 USC § 103

3.   **Claims 1-3, 5, 8-10, 13-20, 21-23, and 25-27 are rejected under 35 U.S.C. 103(a) as**

being unpatentable over Kempf et al. (USPN 5,359,721) (hereinafter Kempf) in view of Chu

(USPN 6,256,657) (hereinafter Cannavino) in view of Chu (USPN 6,256,657).

4.   As per claims 1-3 and 5, Kempf teaches the invention as claimed, including a method,

comprising the steps of loading a code module into a memory space of a first domain, the code

module including an instruction having a symbol reference (col. 6 line 60 - col. 7 line 22);

        determining if the symbol reference is to an external location outside of the memory

space (col. 9 lines 3-13);

        generating a link stub for the symbol reference when the symbol reference is to an

external location to access the external location (col. 9 lines 14-25), wherein the link stub is a

jump instruction to the external location (col. 9 lines 14-25) that is part of a linking table entry

corresponding to the symbol reference (col. 7 lines 23-44); and

        redirecting the instruction to the link stub (col. 9 lines 14-25).

5.   Cannavino teaches the invention as claimed, including determining if the external location is within a second domain that is within a protection view of the first domain (col. 15 line 62 - col. 16 line 3);

requesting attachment of the second domain to the first domain when the second domain is determined not to be within the protection view of the first domain (col. 16 lines 5-10);

determining whether the attachment request is permitted based on authorization information provided by the first domain (col. 16 lines 10-15); and

attaching the second domain to the first domain using an attachment mechanism (col. 13 line 60 - col. 14 line 7), wherein attachment to the second domain is not permitted when the attachment request is not permitted (col. 16 lines 10-15).

6.   Chu teaches the invention as claimed, wherein the first domain owns one of a kernel space and a portion of a user space and the second domain owns the other one of the kernel space and a portion of the user space (col. 6 lines 21-26, 56-61; col. 7 lines 54-57).

7.   There are numerous advantageous features taught by Cannavino for allowing cross-address space calls that are deficient in Kempf. While Kempf allows dynamically linking across address spaces, Kempf fails to account for several potential irregularities including exception handling for unauthorized accesses and attachment of separate address spaces. It is noted that neither Kempf nor Cannavino use the claimed language of a "protection view". It is Examiner's understanding that the claimed protection view acts as a set of domains to which an object in a particular domain may access. Cannavino shows this feature through the use of address space tables that indicate what address spaces access is authorized. Cannavino shows numerous other claimed features and the combination thereof with Kempf would have been obvious since it

would allow cross domain memory protection while also limiting the restrictions on calls that a program can make.

Furthermore, by this amendment, Applicant seeks to clarify the claimed invention over the combination of Kempf and Cannavino by requiring the first and second domains to own opposing domains corresponding to a kernel space and a user space. Chu demonstrates that this is a well-known organization principle for protection domains and that conventional virtual memory address remapping supports the attachment of a kernel space domain into a user space domain, as claimed. It would have been obvious to one of ordinary skill in the art to consider Chu in combination with Kempf and Cannavino, as cross-domain address linking has limited functionality if only user application spaces are permitted to link to each other. When a user application needs to make a system call, e.g. an input/output operation, there is still a great deal of overhead incurred by invoking a supervisor or, for example, requiring a virtual machine to perform an expensive trap operation. Allowing cross-linking of user and kernel spaces would allow such operations to occur in a much faster fashion, increasing the processing speed of the computer while maintaining security.

8.   As per claims 8-10 and 13-14, Kempf teaches the invention as claimed, including a method, comprising creating a task in a first domain, the task executing a number of instructions (col. 6 line 60 - col. 7 line 22);

executing a first jump instruction in the number of instructions that refers to a link stub corresponding to an external location in a second domain (col. 9 lines 14-25), wherein the link

stub includes a second jump instruction to the external location (col. 9 lines 14-25) and is part of linking table entry corresponding to the external location (col. 7 lines 23-44); and

executing the link stub (col. 9 lines 14-25).

9.   Cannavino teaches the invention as claimed, including comparing the external location to a task protection view (col. 15 line 62 - col. 16 line 3);

generating a processing exception when the external location is outside the task protection view (col. 16 lines 30-40); and

executing an exception handling routine in response to the generation of the processing exception, the exception handling routine including saving a pre-exception setting of the task protection view on a task protection switch stack (col. 16 lines 45-54);

altering the task protection view to include a protection view of the second domain (col. 16 line 57 - col. 17 line 5);

jumping to the external location (col. 17 lines 5-11);

retrieving the pre-exception setting of the task protection view (col. 16 lines 48-50);

restoring the task protection view using the pre-exception setting of the task protection view (col. 17 lines 36-42); and

returning to a subsequent instruction to the first jump instruction in the number of instructions (col. 17 lines 43-56).

10.   Chu teaches the invention as claimed, wherein the first domain owns one of a kernel space and a portion of a user space and the second domain owns the other one of the kernel space and a portion of the user space (col. 6 lines 21-26, 56-61; col. 7 lines 54-57).

11.   As per claims 15-20, Kempf teaches the invention as claimed, including a computer

system, comprising:

        a system space having a number of memory locations (col. 6 line 60 - col. 7 line 9);

        a number of protection domains, at least one of the number of protection domains owning

a portion of the system space (col. 6 line 60 - col. 7 line 9), wherein the at least one of the

number of protection domains is a system protection domain that includes at least one code

module including executable code for operating system services (col. 5 lines 36-54) and at least

one system object owned by the system protection domain (col. 5 lines 36-54), and the at least

one of the number of protection domains includes at least one of:

        a code module (col. 6 line 60 - col. 7 line 9);

        a link stub (col. 9 lines 14-25) that is part of a linking table entry in a linking table (col. 7

lines 23-44); and

        an entry point represented in a symbol table (col. 9 lines 14-25).

12.   Cannavino teaches the invention as claimed, wherein each of the number of protection

domains includes a protection view defining a set of the number of protection domains to which

unprotected access may be made (col. 16 lines 10-15); and

        the system protection domain includes a protection domain list that includes entries for

each of the number of protection domains (col. 15 line 62 - col. 16 line 3).

13.   Chu teaches the invention as claimed, wherein the first domain owns one of a kernel

space and a portion of a user space and the second domain owns the other one of the kernel space

and a portion of the user space (col. 6 lines 21-26, 56-61; col. 7 lines 54-57).

14.   As per claims 21-23, Kempf teaches the invention as claimed, wherein at least one of the

number of protection domains is a first protection domain that includes at least one code module

including executable code for a first set of functions (col. 6 line 60 - col. 7 line 9);

        a number of link stubs (col. 9 lines 14-25);

        wherein at least one of the link stubs corresponds to a symbol referenced in the

executable code for the first set of functions (col. 6 line 60 - col. 7 line 22), and such at least one

link stub includes executable code to direct execution to the executable code for operating

system services (col. 9 lines 14-25);

        wherein the number of protection domains includes a second protection domain that

includes at least one code module including executable code for a second set of functions (col. 9

lines 14-25);

        a number of entry points (col. 9 lines 14-25);

        wherein each of the entry points corresponds to a symbol in the executable code for the

second set of functions (col. 9 lines 14-25); and

        wherein one of the link stubs of the first protection domain corresponds to one of the

number of entry points in the second protection domain, and such link stub includes executable

code to direct execution to the one of the number of entry points in the second protection domain

(col. 9 lines 14-25).

15.   As per claims 25-27, Cannavino teaches the invention as claimed, wherein the protection

view sets a contiguous memory range of allowable memory accesses (col. 6 line 59 - col. 7 line

12), and wherein a memory fault is generated when memory access is attempted outside of the memory range (col. 16 lines 45-54); and

an exception handling routine that is executed on the occurrence of the memory fault, the exception handling routine including a protection switch mechanism (col. 16 lines 30-54)

Response to Arguments

16.   **Applicant's arguments with respect to claims 1-3, 5, 8-10, 13-13, and 25-27   have been considered but are moot in view of the new grounds of rejection.**

Conclusion

17.   Applicant's amendment necessitated the new grounds of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Syed J. Ali whose telephone number is (571) 272-3769. The examiner can normally be reached on Mon-Fri 8-5:30, 2nd Friday off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Meng-Ai T. An can be reached on (571) 272-3756. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Syed Ali
August 22, 2005

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